

IDENTICAL TWIN—"IDIOT SAVANTS"—CALENDAR CALCULATORS¹

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The phenomenon of the "idiot savant" has long been known in psychological literature. Classically, the term describes those individuals with sub-normal intelligence, frequently in imbecile range, who have a special highly developed intellectual skill incongruous with other areas of mental functioning. Theories attempting to explain the phenomenon have postulated that (1) these individuals have an unusual capacity for eidetic imagery; (2) the skill represents a mechanism utilizing memory and repetition as a substitute compensation for normal learning; (3) there is a specialized computer-like mechanism in the brains of these individuals. No theory has yet sufficed to account for the diversity of phenomena described nor for the fact that these unusual skills are seen almost exclusively in males. The current concepts are that the human organism, motivated to achieve his capabilities through constant practice and use of his skilled memory and eidetic imagery, develops his special talents; that if any normal individual would be forced to do nothing but indulge in these memory skills he probably could accomplish the equivalent.

The present case report of identical twins, Charles and George, 24-year-old male calendar calculators, shows many of the features of cases reported in the litera-

ture as well as certain unique features. These twins are self-taught with I.Q.'s in the 60-70's; they have an uncanny memory for dates not reflected in other aspects of learning. They can recall almost any day and can state accurately whether it was cloudy, sunny or rainy. Their calendar calculations go far beyond the range of any hitherto reported. Although Charles is completely accurate only for this century, George can project his calendar identifications to centuries before and centuries beyond our present perpetual calendars. With equal facility, George can identify instantaneously the 15th of February 2002 as a Friday, or August 28th, 1591 as a Wednesday. They do not know the difference between the Gregorian and Julian calendars (the change-over was in the year 1582), but when they identify dates before 1582, if one allows for the 10-day difference between the calendars, George is invariably right, Charles usually so. George has a range of at least 6000 years. Other facets of their calendar calculating serve to compound the riddle of their inexplicable skill. For example, when asked in what years April 21st will fall on a Sunday, each will answer correctly 1968, 1957, 1963, 1946, *etc.* When encouraged, George can continue as far back as 1700. When asked in what month of the year 2002 does the 1st fall on a Friday, George gave March, February and November—correct answers. They can also tell you correctly that the 4th Monday in February, 1993 is the 22nd or that the 3rd Monday in May, 1936 was the 18th. This is even more impressive when we note that like many other calendar calculators reported, George and Charles cannot add, subtract, multiply or divide simple single digit numbers. For example, the product of 3×6 might be given as 8. Although they cannot add up to 30, when given your birth date, they can accurately tell you it is 30 weeks until your next birthday or 13 weeks since you last had a birth-

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day. George can tell you the year a particular famous man in history—for example, George Washington was born and how old he would be if he were alive today.

The twins' background is of some interest. The father, a self-made successful businessman, died at the age of 58 of cancer of the lung. He was a chronic alcoholic who had been tied to his mother and married late. It was said he never drank on the job, but on the way home from work he would often drink, become enraged, abusive and aggressive and would strike his wife and children. The mother is alive, age 64, and is given to mild mood swings. She had 3 normal pregnancies. The first child died at 13 months reportedly following convulsions. The next two were healthy girls, both trained as nurses and are now married. One of them had been given to depressions. Our twin patients are from the 4th pregnancy, which occurred during the period of their father's excessive drinking and abusive behavior. The mother was upset and vomited frequently throughout this pregnancy. At 6 months she hemorrhaged, was rushed to a hospital and gave birth by caesarian section to triplets—two boys and a girl. The girl died within 12 hours. The boys, Charles and George were kept in incubators for 2 months. It is noted in the history that both had convulsions when removed from the incubators, but none since. Throughout the twins' childhood the home life was tempestuous; the parents fought and there was talk of divorce. The twins were "good babies" whose early health was good except for ear infections. George held his head up at 6 months, sat at 9 months, but did not walk or talk till 2½ years. Charles, the first-born, lagged behind George. They were not difficult to manage until they began to walk. As soon as they walked they ran. There was head banging, biting of their hands, spilling water, destroying things in the house, *etc.* At 3 the mother was told by the pediatrician they were retarded and that they could not be enrolled in school. She did not know what the word "retarded" meant and the pediatrician explained the boys would never be mathematicians. The mother's reaction was frequently expressed as "thank goodness Mary died; otherwise there would be 3."

She repeatedly said she wanted to kill herself and take the boys with her. Both parents were ashamed of the twins, but the mother and sisters would try to teach them letters, numbers, *etc.*, for the few minutes that they could hold the twins' attention.

The development of George's special talent was observed at age 6—it had been noted that he would spend hours poring over an almanac which contained a perpetual calendar. From what has gone before it comes as a distinct surprise that George *could* or would pore over the almanac at 6 years, but the fact is George could decipher the almanac. The parents felt this talent was a compensation from God and the father later got a silver perpetual calendar that George played with for hours and hours. He made no errors from the beginning. A paternal aunt, a legal secretary, used to call to check dates of documents with him. The father praised George—calling him a smart boy. This pleased George, who frequently asked why he was different from the sisters. Charles, who was always slower in both physical and mental development, did not play with the almanac and initially showed no interest in dates. He and George had no close relationship until they were institutionalized at Letchworth Village at age 9. At that time George and Charles became inseparable. Charles became interested in telling dates but was noted to go through a period in which he made many mistakes. Both were only interested in this one activity, although they were capable of learning other things; for instance George can pick out tunes on the piano and knows the Greek alphabet.

At 9 they were taken to Letchworth Village and have been there for the past 15 years. The records at Letchworth are replete with notes of fighting, biting, destructiveness, *etc.* They spent about a year at school in Letchworth, but their behavior was difficult. They were transferred to Psychiatric Institute in April, 1963 for further study and there has been considerable improvement in their behavior. They have been cooperative and are willing, with some satisfaction, to exhibit their prowess. At first the other patients seemed frightened, but now the twins are the pets on

the ward. They both are now able to wear plastic glasses; both are severely myopic, but they do not have retrolental fibroplasia, first suspected because of their having been in incubators for 2 months.

Of the twins, Charles seems to have more impairment than George. He has a left strabismus, horizontal and vertical nystagmia, some retinal changes in one eye as well as vitreous opacities. They both have rocking and swaying movements. Clinically both seem hyperosmic; frequently both go up to people sniffing and smelling. Although each can pick out his own shoes and bedroom slippers by smell, on quantitative smell tests neither performed better than average. EEG's here and previously at Letchworth have been normal.

Chromosome studies have shown normal karyotypes. The initial chromosome examinations suggested "mosaicism" with some cells of 45, 46 and 47 chromosomes. When this was repeated in our own laboratory and in the more experienced laboratory of Dr. M. Grumbach at Presbyterian Hospital, this finding was not confirmed. From a genetic standpoint they are now considered normal males. The similarity method of zygosity diagnosis, fingerprint examination and blood groups (O, N, Rh₁-DCc positive, E negative-Duffy positive, Kell negative) strongly suggest monozygosity. Other pertinent laboratory tests have been non-contributory so far. Ferric chloride, for phenyl pyruvic acid, dinitro phenyl hydrazine for keto acids, serum for ceruloplasmin, serum protein partition and P.B.I. are all normal. Urine amino acid fractions and 17 keto and hydroxy steroids are being studied.

Since their admission to our hospital, with a reduction in their fears and acceptance by our staff and patients, their behavior has improved and their I.Q.'s have risen. They now test between 60 and 70 in comparison to 40-50 range in previous years.

The problem raised by this pair of identical twins remains inexplicable. Although other cases of calendar calculators in mentally deficient people are not rare, this is the first pair of identical twins where each has a skill of calendar calculation beyond the range of known perpetual calendars. This feature casts doubt on explanations

previously offered, namely that the skill developed is merely a hypertrophied repetition of a memory function or an extended eidetic imagery that allows for visual recall of previously learned experiences. Another explanation is that such individuals have a defect of abstract capacity along with an endowed talent that continues to be exercised because only through this performance can the limited individual come to terms with his environment. As long as the performance ranged within the limits of what could be memorized, learned or recalled, such explanations were plausible and had previously been accepted. However, our twins demonstrate their ability in areas where memory, learning and recall are not available to them. In addition, they operate so rapidly that it is obvious they use no formula even if they were capable of learning one. They operate in a range of calendar calculation far before and beyond our usual 200-400-year perpetual calendar. The longest known perpetual calendar extends to about the year 2400 and one of the twins can reach beyond the year 7000. Furthermore, they can calculate dates for which no formal calendar exists such as the years in which a certain day in a certain month falls on a Sunday, *etc.*, or which month in a certain year will the first fall on a Friday, *etc.* It is possible that motivational factors have extended the range of their unique skill, but this does not account for the basic structure of the skill. They do not have even a remote idea how they perform—saying "I know," or "It's in my head." After exploring their abilities with various people in different learned fields—psychiatrists, psychologists, internists and mathematicians, *etc.*, we must candidly admit that we have no better explanation. By showing that previous explanations really must again be questioned, we hope to indicate that other factors, probably beyond our present knowledge, must be understood before we have a better explanation than do our Identical Twin-Idiot Savants.

DISCUSSION

ARTHUR P. HOLSTEIN, M.D. (Northville, Mich.).—It seems to work out as a general rule, that individuals who have gross chromo-

somal deformities in either size, shape, form, or number are grossly deformed individuals in other respects, and can be easily characterized clinically by many physical stigmata, for example, the Mongol and the Klinefelter's and Turner's Syndrome. George and Charles have no chromosomal defect and in a general fashion they are not grossly deformed individuals.

The Idiot-Savant seems to constitute a distinct syndrome; the general characteristics of which are as follows: first, their I.Q. is very low, most of them being around 50 or lower, one case reported had an I.Q. of 8. George's and Charles' I.Q. have been in this range. In contrast to this exceedingly low I.Q., there is usually associated a marked increase in certain specific mental abilities. These are usually associated with calculation, and frequently with calendar calculations. The twins demonstrate this adequately. Other aspects of their problem-solving ability are more in line with their low I.Q. It is especially noted that the ability to function in abstract fashion seems to be lacking. George and Charles can subtract apples but not dollars. The age of onset is usually in childhood, and the approximate age of 7 years is noted in several protocols. Curiously enough, most of the people involved have been men although there are a few women noted who apparently have these abilities. The protocols in the literature are abbreviated and whether or not the men show differences in abilities from the women cannot be ascertained. However, raising the question of a sex-linked characteristic seems appropriate at present. Many of them seem to have musical abilities which are somewhat better than one might expect from a person with a low I.Q. They are able to play musical instruments by ear. However, they are unable to learn to play these instruments in the usual fashion and cannot be taught to read music. Also to be noted is the fact that they enjoy listening to music. George and Charles have these abilities. Frequently it is mentioned that the person with this ability has an associated degree of interest in art and mechanical skills, which are well beyond those of the usual mentally retarded or normal person. Tredgold's original case is certainly a fine example of this. Scheerer notes that the Idiot-Savant frequently has an acutely perceptive sensory sensitivity. George and Charles can identify their shoes by smelling them. The reports do not clearly differentiate the various types of retardation occurring in the individuals reported on, however, it does appear that there is no specific type of retardation associated with the ability to calculate. For example, one young woman

developed the ability following a case of typhoid encephalitis at the age of 17. Another young man who had the extremely low I.Q. of 8 was a spastic paraplegic from birth injury and though unable to talk had a phenomenal calendar memory somewhat approaching the abilities of the twins. The twins themselves have a type of mental retardation which is associated with their ocular defect of chorio retinitis and is transmitted as a mendelian recessive. This variation of cause should rule out that the Idiot-Savant is an autistic child grown up.

In considering the abilities of the twins (and Dr. Horwitz assures me that their identicalness extends through their blood types) the skill is not developed comparably in each. George developed it first and has more of the ability than Charles. Significantly he is the taller and dominant member of the pair. He is also the youngest. The fact that identical twins can develop differently in some aspects of their appearance and personality is not unusual and has been recorded in numerous instances. For example, Shields, in his book on *Monozygotic Twins, Brought Up Apart and Brought Up Together*, documents this many times. Rosenthal, writing about the Genain Quadruplets, has gathered together a significant amount of material on 4 monozygotic sisters who similarly show personality differences which are easily observed.

It is interesting to speculate that perhaps the phenomenon of a type of memory which Idiot-Savants have represents memory which in some fashion has developed separately from general intellectual ability as a part of the personality. This notion is not unusual since paranoid schizophrenics have an exquisite memory, and in a general way they incorporate their memory ability into their personality. At any rate, the qualities of memory that George and Charles and the others exhibit are apparently not associated with any aspects of mental functioning associated with their intelligence of which they are impoverished.

The importance, then, of the Idiot-Savant lies in our inability to explain him; he stands as a landmark of our own ignorance and the phenomenon of the Idiot-Savant exists as a challenge to our capabilities.

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